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CHEVRON CORPORATION
P.O. BOX 6006
SAN RAMON, CA 94583-0806

EXAMINER	
GOLOBOY, JAMES C	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/738,388	TEQUI ET AL.	
	Examiner	Art Unit	
	James Goloboy	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-2, 4-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-2, 4-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's amendment filed 10/22/07 overcomes all the rejections set forth in the office action mailed 5/21/07. New grounds of rejection necessitated by the amendment are set forth below.

Claim Rejections - 35 USC § 103

2. Claims 1-2, 5, and 20-21 rejected under 35 U.S.C. 103(a) as being unpatentable over Li in view of Dickey and De Vries.

Li discloses a lubricant composition comprising a non-aqueous lubricant, such as an oil, as disclosed in column 3 lines 19-32, boron nitride, as disclosed in column 3 line 34, and a polymethacrylate, as disclosed in column 5 lines 27. In column 3 lines 44-45 a concentration of 0.5 to 20% by weight of boron nitride is disclosed, and in column 5 lines 31-32 a concentration of 0.5 to 15% by weight of polymethacrylate is disclosed. The ratio of boron nitride to polymethacrylate disclosed by these ranges is therefore between 40:1 and 1:30, falling well within the ranges recited in Claims 1 and 20.

Li further discloses in column 3 lines 29-30 that the lubricant composition may comprise a surfactant, as recited in Claim 5.

The differences between Li and the currently presented claims are:

i) Li discloses the genus of boron nitride without any indication of the desired morphological species.

ii) Li does not disclose the particle size of the boron nitride.

With respect to i), Dickey discloses on page 33 that hexagonal boron nitride provides "excellent lubrication". No other types of boron nitride are mentioned in the article.

With respect to ii), De Vries, in column 2 lines 14-28, discloses a solid lubricant additive which may be boron nitride (line 26), and preferably all of the particles have a particle size of 0.001 microns to 1 micron. (1 millimicron, lines 19-21).

It would have been obvious to one of ordinary skill in the art to include in the additive composition taught by Pacholke, Dickey, and Papay a boron nitride with the small particle size taught by De Vries, in order to impart superior lubricity to the composition, as disclosed in column 2 lines 14-16 of De Vries.

3. Claims 1-2, 4, 6, 9, and 20-23 rejected under 35 U.S.C. 103(a) as being unpatentable over Pacholke in view of Dickey, Papay, and De Vries.

Pacholke discloses in column 3 lines 20-53 an additive composition comprising boron nitride (line 24) and a carrier fluid (column 6 lines 10-21), which may be an oil. Pacholke also discloses in column 3 lines 54-55 that the additive is added to a lubricating oil, specifically a gear oil. In column 5 line 37, Pacholke further discloses an additive composition comprising 25% of an olefin copolymer by weight. As the disclosure does not reveal the possibility of any additional components in the additive, it is clear that the carrier fluid (oil) and solid lubricant (boron nitride) must make up the other 75%, falling within the range recited in Claim 6.

In column 4 line 63, Pacholke discloses a concentration of between 0.01 and 65% for boron nitride within the full additive composition. In column 5 line 39, Pacholke discloses a concentration of between 3.0 and 5.0% by weight for the olefin copolymer component. As the only other component in the additive mixture is the oil dispersion of boron nitride, this dispersion therefore makes up between 95 to 97% by weight of the additive composition, meaning that the concentration of boron nitride in the oil dispersion is between about 0.01 and about 68% (65/95 = 0.68), encompassing the range recited in Claim 4. In column 4 lines 63-65, Pacholke notes that the final selection a boron nitride concentration from within the disclosed range depends on the application, signifying the concentration as a result-effective variable. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See MPEP § 2144.05 (B). Case law holds that "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Pacholke also shows, in columns 6-7 (Examples 1-3), three sample additive compositions comprising equal amounts of a solid lubricant and a neutral petroleum oil—equivalent to a 50% dispersion of the solid lubricant in oil, matching the 50% endpoint of the range recited in Claim 4. Although the sample compositions utilize molybdenum disulfide and graphite as the solid lubricant, the list in column 3 lines 22-27

names boron nitride as an alternative solid lubricant, and the sample compositions strongly suggest to one of ordinary skill in the art the 50% dispersion recited in Claim 4.

In column 5 line 46, Pacholke discloses a range of between 0.001 to 10% by weight of the additive composition in the overall lubricant composition, substantially overlapping the range recited in Claim 22.

The differences between Pacholke and the currently presented claims are:

i) Pacholke does not specifically disclose hexagonal boron nitride.

ii) Pacholke does not disclose the further addition of a polymethacrylate or a dispersant olefin copolymer.

iii) Pacholke does not disclose a particle size distribution for the boron nitride.

With respect to i), Dickey discloses on page 33 that hexagonal boron nitride provides "excellent lubrication". No other types of boron nitride are mentioned in the article.

With respect to ii), Papay teaches in column 46 lines 26-43 viscosity index improvers which are standard lubricant additives suitable for use in gear oils (column 47 lines 51-54). The viscosity index improvers include ethylene-propylene copolymers grafted with maleic anhydride and possibly further reacted with an alcohol or alkylene polyamine, forming a dispersant olefin copolymer, and also polymers of alkyl methacrylates and copolymers of alkyl methacrylates with nitrogen-containing polymers. Papay thus discloses both non-dispersant and dispersant polymethacrylates.

With respect to iii), De Vries, in column 2 lines 14-28, discloses a solid lubricant additive which may be boron nitride (line 26), and preferably all of the particles have a particle size of 0.001 microns to 1 micron. (1 millimicron, lines 19-21).

It would have been obvious to one of ordinary skill in the art to use the hexagonal form of the boron nitride disclosed by Pacholke, in order to gain extra lubricity, based on the teaching of Dickey. It would have been obvious to one of ordinary skill in the art to add the viscosity index improvers of Papay to the composition of Pacholke in order to improve the viscosity properties of the lubricant at high and low temperatures, and also to impart dispersancy. It would have been obvious to one of ordinary skill in the art to include a boron nitride with the small particle size taught by De Vries, in order to impart superior lubricity to the composition, as disclosed in column 2 lines 14-16 of De Vries.

4. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pacholke in view of Dickey, Papay, and De Vries as applied to claims 1-2, 4, 6, 9, and 20-23 above, and further in view of Ishikawa.

The discussion of Pacholke, Dickey, Papay, and De Vries in paragraph 2 above is incorporated here by reference. Pacholke, Dickey, Papay, and De Vries disclose a composition including a non-dispersant or dispersant polymethacrylate, but do not disclose the length of the hydrocarbon side chain on the polymethacrylate.

Ishikawa discloses in column 8 lines 34-49 that a non-dispersant polymethacrylate preferably has a hydrocarbon chain with 1 to 18 carbons, and in column 9 lines 8-14 discloses that the dispersant polymethacrylate also has a

hydrocarbon chain with 1 to 18 carbons. Although the terms "short", "medium", and "long" recited in Claims 7 and 8 are not defined within the claim, the range given in the reference for the length of the hydrocarbon chains encompasses all the types disclosed on page 8 lines 18-28 of the present specification. The detailed description is a dictionary for the claims. See MPEP § 608.01(g).

It would have been obvious to one of ordinary skill in the art to incorporate into the lubricant composition of Pacholke, Dickey, Papay, and De Vries a polymethacrylate with a short, medium, or long hydrocarbon chain for the purpose of obtaining enhanced viscosity-temperature behavior and perhaps enhanced dispersancy.

5. Claims 10-13 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pacholke in view of Dickey, Papay, and De Vries as applied to claims 1-2, 4, 6, 9, and 20-23 above, and further in view of Peeler.

The discussion of Pacholke, Dickey, Papay, and De Vries in paragraph 2 above is incorporated here by reference. In column 37 lines 56-66 and column 39 lines 23-39 (Example C-5), Papay teaches that the lubricating composition can additionally contain an alkali metal borate in order to help prevent scuffing. Papay does not disclose whether the borates are hydrated.

Peeler, in the reference's Claims 1 discloses an oil dispersion of an alkali metal borate and a dispersant (the borate is "dispersed by means of a lyophilic surface active agent"), as recited in Claims 10 and 14. In the reference's Claims 5 and 6, Peeler teaches that the alkali metal may be sodium or potassium, as in Claims 11 and 12. In

the reference's Claim 1 is it also taught that the borate is present in the oil dispersion in a concentration of 2 to 60% by weight, substantially overlapping the broad ranges recited in Claim 15 and 19, and encompassing the range recited in Claim 16 while matching the endpoint at 2%.

Peeler further discloses in column 3 lines 35-36 that a detergent may be added to the dispersion as recited in Claim 17, and in column 3 lines 38-39 teaches that the detergent may be present in a concentration of 0.1 to 5%, overlapping the range recited in Claim 18.

It would have been obvious to one of ordinary skill in the art to include in the lubricant composition of Pacholke, Dickey, Papay, and De Vries the oil dispersions of hydrated alkali metal borates disclosed by Peeler in order to obtain better extreme pressure lubricating performance, as taught in column 1 lines 53-56 of Peeler, and to avoid scuffing at extreme pressures as taught by Papay and Peeler at column 1 line 29. It would have been obvious to include a detergent in the oil dispersion of hydrated alkali metal borates for the purpose of preventing the buildup of residues.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pacholke in view of Dickey, Papay, and Peeler as applied to claims 10-13 and 15-19 above, and further in view of Brown.

The discussion of Pacholke, Dickey, Papay, and De Vries in view of Peeler in paragraph 14 above is incorporated here by reference. Pacholke, Dickey, Papay, and De Vries in view of Peeler does not disclose hydrated potassium triborate as an alkali

metal borate additive. Papay, in example C-5, does disclose potassium triborate as an additive but does not disclose whether it is hydrated.

Brown, in column 2 lines 26-27 discloses the use of hydrated potassium triborate as a preferred alkali metal borate.

It would have been obvious to one of ordinary skill in the art to modify Pacholke, Dickey, Papay, and De Vries in view of Peeler to include the use of hydrated potassium triborate due to its favorable extreme pressure properties, as taught in column 2 line 30-32 of Brown.

Response to Arguments

7. Applicant's arguments filed 10/22/07 have been fully considered but they are not persuasive.

Applicant has amended claim 1 to require that at least 90% of the boron nitride particles have a particle size of less than about 0.5 microns, and argues that De Vries does not address the particle size distribution of the solid particles. However, De Vries teaches that "substantially all" of the particles preferably have a particle size of 0.001 micron to 1 micron. "Substantially all" falls within, or at least strongly overlaps, the "90% or greater" limitation of claim 1, and the particle size range of De Vries overlaps the range of less than 0.5 microns recited in claim 1. "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976);"

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Goloboy whose telephone number is 571-272-2476. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

James C. Goldby
JCG

Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700